Brix Maritime Company Response to EPA's 104(e) Information Request

Entire response Releasable

Oregon DEQ

Environmental Cleanup Site Information (ECSI) Database
Site Summary Report - Details for Site ID 2364

This report shows data entered as of August 11, 2006 at 7 06 00 AM

This report contains site details, organized into the following sections: 1) Site Photos (appears only if the site has photos), 2) General Site Information, 3) Site Characteristics, 4) Substance Contamination Information; 5) Investigative, Remedial and Administrative Actions, and 6) Site Environmental Controls (i.e., institutional or engineering controls; appears only if DEQ has applied one or more such controls to the site) A key to certain acronyms and terms used in the report appears at the bottom of the page

Go to DEQ's Facility Profiler to see a site map as well is information on what other DEQ programs may be active at this site

General Site Information

Site ID: 2364	Site Name: Foss Maritime/Brix Maritime		CERCLIS No:
Address:	9030 NW St. Helens Rd Portland 97231		
	County: Multnomah		Region. Northwest
Other location information:			
Investigation Status:	Listed on CRL or Inventory		
	Brownfield Site: No	NPL Site: No	Orphan Site: No / Study Area: No
Property:	Twnshp/Range/Sect: 1N , 1W , 11		Tax Lots:
	Latitude: 45.5877 deg	Longitude: -122.7713 deg.	Site Size: 4.46 acres
Other Site Names:	Brix Maritime Portland Harbor Sediment Study Knappton Corp.		

Site Characteristics

General Site Description:	
Site History:	
Contamination Information:	Weston sampling results from the Portland Harbor Sediment Study revealed PAHs, thallium and butylbenzylphthalate in river sediments adjacent to the site. (11/20/01 RGS/VCP) Sampling performed during the Preliminary Assessment detected TPH, benzene, ethylbenzene, xylenes, naphthalene, PAHs, and 1,2,4-trimethylbenzene in uplands soil and groundwater. (12/23/02 RGS/VCP) Detections are associated with releases of petroleum hydrocarbons from USTs. A pre-remedial investigation was initiated in summer 2002. Lubricating oil released from an UST has been observed in one monitoring well as a NAPL. An RI is currently being conducted to assess the potential for upland releases of petroleum hydrocarbons to migrate to the Willamette River via groundwater.
Manner and Time of Release:	

BRIXDEF000031

Hazardous Substances/Waste Types:	
Pathways:	
Environmental/Health Threats:	Petroleum contamination documented on-site could threaten on-site workers, as well as ecological receptors in the adjacent Willamette River.
Status of Investigative or Remedial Action:	(6/8/99 JMW/SAP) Based on initial sampling results from a river sediment quality study, the Foss Maritime facility has been identified as a potential source of contamination to the Portland Harbor. A Site Assessment Review Notice was sent 3/3/99. Response from Foss Maritime received 4/12/99. A site screening is scheduled (level III priority). (12/21/99 TG/SAP) Strategy Recommendation completed November 1999. An expanded Preliminary Assessment (XPA) at Foss Maritime should be conducted to evaluate sediment contamination, potential upland site contaminant sources and past waste-management practices, and to determine the extent and source(s) of observed sediment contamination at sample station SD052. An XPA is a high priority for follow-up. (4/2/01 RGS/VCP) DEQ has reviewed and commented on the Preliminary Assessment report provided by Foss. DEQ requested a focused sampling investigation. (11/21/01 RGS/VCP) Brix submitted and implemented a work plan for investigating contamination around the current and former USTs. This work occurred with no DEQ oversight. In June 2001, DEQ and Brix representatives met to discuss the results of the UST investigation, which indicated that soil and groundwater had been impacted. DEQ identified several data gaps based on this preliminary review. In September 2001, Brix submitted a report documenting the findings of the UST investigation. DEQ determined further action is needed and recommended a Pre-RI under the Portland Harbor Agreement. (12/23/02 RGS/VCP) A Voluntary Agreement for the RI was signed in May, 2002. RI activities began in May and are on-going.
Data Sources:	1) See also Spill files: 95-145, 95-486, 95-1175, 96-222, 96-1679, 96-1403, 97-201, 97-1857, 97-2378, 97-2489, 98-67, 98-75, 98-622, 98-2225, 98-3142; 2) Portland Harbor Sediment Investigation Report, prepared by Roy Weston, Inc. for USEPA, May 1998; 3) Foss Maritime Company's response to DEQ Site Assessment Information Request, March 31, 1999; 4) DEQ LUST Database; DEQ HWIMSy Hazardous Waste Generator Database, DEQ SPINS Spill Database; MetroScan Property Records, Multnomah County, Oregon; 5) "Supplemental Preliminary Assessment Summary Report", Anchor, October 2000; 6) "Work Plan for UST Investigation", Hahn and Associates, May 2001; 7) "Sampling Results Report in Support of the Preliminary Assessment", Anchor, September 2001; 8) "Remedial Investigation Workplan, Brix Maritime Company, Portland, Oregon", Anchor, February 2005 (as supplemented by Addendum 1, prepared by Anchor in August 2005); 9) Quarterly progress reports prepared by Anchor; 10) DEQ project files

Substance Contamination Information

Substance	Media Contaminated	Concentration Level	Date Recorded
BENZENE	Groundwater	125 ppb	5/29/2001
BENZENE	Soil	5.2 ppm	5/24/2001
BUTYL BENZYL PHTHALATE	Sediment	29 ppb - downstream	9/1/1997
NAPHTHALENE	Groundwater	65 1 ppb	5/24/2001
NAPHTHALENE	Soil	11.1 ppm	5/24/2001
POLYAROMATIC			

HYDROCARBONS (PAH)	Groundwater	7.445 ppb	5/29/2001
POLYAROMATIC HYDROCARBONS (PAH)	Sediment	LPAH 803 ppb - downstream	9/1/1997
POLYAROMATIC HYDROCARBONS (PAH)	Sediment	HPAHs 3907 ppb - downstream	9/1/1997
TOTAL PETROLEUM HYDROCARBONS (TPH)	Soil	Up to 53,400 ppm	1/26/1993
TRIMETHYLBENZENE,1,2,4-	Groundwater	627 ppb	5/29/2001
TRIMETHYLBENZENE,1,2,4-	Soil	59.8 ppm	5/24/2001
XYLENEs	Groundwater	420.4 ppb	5/29/2001
XYLENEs	Soil	134.9 ppm	5/24/2001

Investigative, Remedial and Administrative Actions

Action	Start Date	Compl. Date	Resp. Staff	Lead Pgm
REMEDIAL INVESTIGATION (Primary Action)	05/08/2002		James Anderson	VCS

View Full Report Showing Action History

Key to certain acronyms and terms in this report:
CERCLIS No.: The U.S. EPA's Hazardous Waste Site identification number, shown only if EPA has been involved at the site.
Region: DEQ divides the state into three regions, Eastern, Northwest, and Western; the regional office shown is responsible for site investigation/cleanup.
NPL Site: Is this site on EPA's National Priority List (i.e., a federal Superfund site)? (Y/N).
Orphan Site: Has DEQ's Orphan Program been active at this site? (Y/N). The Orphan Program uses state funds to clean up high-priority sites where owners and operators responsible for the contamination are absent, or are unable or unwilling to use their own resources for cleanup.
Study Area: Is this site a Study Area? (Y/N). Study Areas are groupings of individual ECSI sites that may be contributing to a larger, area-wide problem. ECSI assigns unique Site ID numbers to both individual sites and to Study Areas.
Pathways: A description of human or environmental resources that site contamination could affect.
Lead Pgm: This column refers to the Cleanup Program affiliation of the DEQ employee responsible for the action shown. SAS or SAP = Site Assessment; VCS or VCP = Voluntary Cleanup; ICP = Independent Cleanup; SRS or SRP = Site Response (enforcement cleanup); ORP = Orphan Program.

You may be able to obtain more information about this site by contacting James Anderson at (503) 229-6825 or via email at anderson.jim@deq.state.or us If this does not work, you may contact Gil Wistar at (503) 229-5512, or via email at wistar.gil@deq.state.or.us or contact the Northwest regional office.

DEQ Online is the official web site for the Oregon Department of Environmental Quality

ORIGINAL - AGREEMENT
ECSI 2364

VOLUNTARY AGREEMENT FOR REMEDIAL INVESTIGATION AND SOURCE CONTROL MEASURES

DEQ NO. LQDVC-NWR-02-03

BETWEEN: Brix Maritime Company

AND: Oregon Department of Environmental Quality (DEQ)

EFFECTIVE DATE: May 8, 2002

Pursuant to ORS 465.260(2) and (4), the Director, Oregon Department of Environmental Quality (DEQ), enters this Agreement with Brix Maritime Company (Brix). This Agreement contains the following provisions:

I. RECITALS

A. Brix is a Delaware corporation authorized to do business in the State of Oregon and is a "person" under ORS 465.200(20).

B. The Brix site occupies approximately 3.7 acres at 9030 NW St. Helens Road, in Portland, Oregon. The Site is bordered to the northeast by the Willamette River, to the southwest by railroad tracks and NW St. Helens Road, to the northwest by a bulk fuel storage facility, and to the southeast by industrial use property. The general location of the property is shown in Attachment A to

this Agreement. The property is referred to in this Order as the "Site" or "Facility."

C. The Brix site is located within or near what is known as the Portland Harbor, a six-mile reach of the Willamette River between Sauvie Island and Swan Island. A 1997 study by DEQ and the U.S. Environmental Protection Agency identified elevated levels of hazardous substances in shallow, near-shore sediments throughout the Portland Harbor. The Portland Harbor sediments will be the subject of a Remedial Investigation and Feasibility Study conducted outside this Order under EPA oversight.

D. Brix has owned the Site since 1979. At the time Brix acquired the Site, it was vacant and undeveloped. Since then Brix has developed the Site for a dispatch and coordination office for its tugboats, including maritime office space, purchasing, maintenance, storage, fueling, crew rotation, and permanent moorage of a covered maintenance work barge. The Site contains two primary structures: an office building and a storage building. With the exception of the riverbank, the Site is entirely developed and covered with asphalt, concrete or buildings. In its operations at the Site, Brix uses diesel fuel, gasoline, lubricating oils, hydraulic fluid, antifreeze, kerosene, paints, and paint thinner. Brix currently generates small quantities of used oil and has generated waste paint in the past. Brix reports that these materials are currently stored indoors and/or under cover to prevent exposure to rain or storm water runoff. Brix alleges that it implements strict inventory controls to ensure that all paint purchased at the Site is used and no waste paint is generated. Brix reports that it does not handle, store, treat, generate or dispose of hazardous waste at the Site.

E. Between 1995 and 1999, sixteen spills in the vicinity of the Brix Site were reported to DEQ. Brix alleges its policy is to report any and all spills observed in or near the river regardless of the source. The spilled materials were generally reported as petroleum products. Several spill reports appear to indicate diesel, lube oil, or bilge water originated from boat operation and maintenance activities at or near the dock at the Site.

F. In January 1993, a release of lube oil was reported to DEQ (LUST #26-93-009) relating to a hole in a 30-weight lube oil transfer line next to the underground storage tank (UST) system on the Site. Brix conducted an investigation and removed approximately 50 cubic yards (cy) of oil-contaminated soil. A report submitted to DEQ, prepared by Hahn and Associates (1994) states that soil with elevated total petroleum hydrocarbon (TPH) concentrations (up to 53,400 milligrams per kilogram (mg/kg)) remain on-site near the location of the pipeline leak.

G. A 2,000-gallon gasoline underground storage tank (UST) and 6,000-gallon lube oil UST were removed from the Site in October 1998. The remaining two 20,000-gallon diesel USTs and one 6,000-gallon

lube oil UST were certified and upgraded in 1998. A diesel release was reported to DEQ on October 19, 1998. DEQ alleges that complete information required by the UST statutes and rules regarding the closure of the two USTs in 1998 has not been submitted to DEQ.

H. On March 3, 1999, DEQ requested information regarding site operations on the Site. On March 31, 1999, Brix provided the requested information to DEQ.

I. In November 1999, DEQ requested that Brix enter into a Voluntary Letter Agreement to perform a preliminary assessment with sampling at the Site. In December 1999, Brix signed the letter agreement.

J. In February 2000, Brix submitted an Expanded Preliminary Assessment Report to DEQ. In April 2000, DEQ requested that sampling be conducted to determine whether releases of hazardous substances have occurred at the site and that additional information on the facility be submitted.

K. In October 2000, in response to DEQ's April 20, 2000 comments, Brix submitted a Supplemental Preliminary Assessment Report to DEQ. In December 2000, DEQ identified areas in which it disagreed with conclusions in the report and requested that additional sampling be conducted to determine whether releases of hazardous substances have occurred at the site.

L. Brix conducted a soil and groundwater investigation at the Site in May-June 2001. This investigation was performed independently without DEQ oversight. This investigation documented the presence of total petroleum hydrocarbons (TPH), benzene, ethylbenzene, xylenes, naphthalene, iso-propylbenzene, n-propylbenzene, 1,2,4-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, polycyclic aromatic hydrocarbons (PAHs) in soil and/or groundwater.

M. In September 2001, Brix submitted its Sampling Results Report to DEQ, which report concluded, based on the site investigations and the risk evaluation presented in the report, that no further characterization or remediation of soils and groundwater is necessary and that the Site is not a source of constituents to the river. In November 2001, DEQ accepted the report as meeting DEQ's requirements for a Preliminary Assessment with sampling, but notified Brix that it did not agree with the conclusions or the risk evaluation presented in the report.

N. The following contaminants were detected in a sediment sample collected approximately 100 feet downstream of the Site at concentrations exceeding baseline concentrations established for the Portland Harbor Study Area: butylbenzyl phthalate and high and low molecular weight polycyclic aromatic hydrocarbons (LPAHs and HPAHs).

O. The substances described in Sections E, F, G, L, and N are "hazardous substances" under ORS 465.200(15). The Brix site is a

"facility" under ORS 465.200(12). DEQ has alleged that hazardous substances are present in soil, groundwater, and sediments at or near the facility, that the presence of those substances constitutes a "release" or "threat of release" into the environment under ORS 465.200(21), and that further site investigations are needed to fully characterize the nature and extent of such releases at, on or from the Site and to support the conclusions in Brix's Sampling Results Report.

P. Therefore, DEQ has requested and Brix has agreed to enter into this Voluntary Agreement to implement the activities required by this Agreement, which DEQ considers to be necessary to protect public health, safety, and welfare and the environment.

II. AGREEMENT

The parties agree as follows:

A. Work

1. Remedial Investigation

Brix shall perform a remedial investigation satisfying OAR 340-122-0080, the terms and schedule of a DEQ approved work plan developed by Brix, and applicable elements of the Scope of Work contained in Attachment B to this Agreement. Brix may specify, in the proposed work plan, elements of the Scope of Work that Brix considers inapplicable or unnecessary to the remedial investigation for the facility. Brix may propose to perform the work in phases or operable units.

2. Source Control Measures

For any unpermitted discharge or migration of contaminants to the Willamette River or sediments identified in the remedial investigation, Brix shall evaluate such discharge or migration, and then develop and implement source control measures in accordance with the Scope of Work.

3. DEQ-Review

DEQ shall provide review, approvals/disapprovals, and oversight in accordance with the schedule set forth in the Scope of Work, or as soon as thereafter practicable in the event staff resources or workload prevent compliance with the schedule. Any DEQ delay shall correspondingly extend Brix's schedule for a related deliverable or activity.

4. Additional Measures

Brix may elect at any time during the term of this Agreement to undertake remedial measures other than those required under this Agreement necessary to address a release or

threatened release of hazardous substances at the facility. Such other measures shall be subject to prior approval by DEQ. Prior approval shall not be required in emergencies where Brix reasonably believes a delay in undertaking a particular action will threaten human health, safety, or the environment; provided that Brix notifies DEQ of the emergency and action as soon as is practicable.

5. Dredging Activities

Brix shall notify the DEQ project manager at least sixty (60) days before undertaking any dredging or other activity that might disturb sediments at or near the facility. In its notice of dredging or other activity, Brix shall: (a) Evaluate the concentration of hazardous substances present in and below the affected sediments based on sampling and analyses performed in advance of the notice; (b) Document the steps to be taken to ensure that both the activity and the subsequent management and disposal of dredged spoils will be conducted in a manner protective of human health and the environment; and (c) Evaluate the effect of the activity on the Portland Harbor Remedial Investigation and Feasibility Study. Dredging may proceed under existing permits subject to the above notice and implementation of any additional dredging or management practices required by DEQ. DEQ shall also be notified of and copied on any permit application to the Oregon Division of State Lands or United States Army Corps of Engineers for dredging or other activity disturbing sediments adjacent to the Brix site. Notwithstanding the foregoing, Brix may conduct dredging or other activities that might disturb sediments at or near the facility without giving DEQ 60 days' notice, if such activities are conducted in accordance with an effective Dredging Agreement between Brix and DEQ that describes the notification and sampling requirements, dredging, management, and disposal practices, and any other measures that Brix will take to ensure that all activities within the scope of the Dredging Agreement are conducted in a manner that is protective of human health and the environment and consistent with Harborwide cleanup work.

B. Public Participation

Upon execution of this Agreement, DEQ will provide public notice of this Agreement through issuance of a press release, at a minimum to a local newspaper of general circulation, describing the measures required under this Agreement. Copies of the Agreement will be made available to the public. DEQ shall provide Brix a draft of such press release and consider any comments by Brix on the draft press release, before publication.

C. **DEQ Access and Oversight**

1. Brix shall allow DEQ to enter all portions of the facility at all reasonable times for the purposes, among other things, of inspecting records relating to work under this Agreement; observing Brix's progress in implementing this Agreement; conducting such tests and taking such samples as DEQ deems necessary; verifying data submitted to DEQ by Brix; and, using camera, sound recording, or other recording equipment for purposes relating to work under this Agreement. Upon Brix's verbal request, DEQ shall make available to Brix a split or duplicate of any sample or recording taken by DEQ pursuant to this Agreement. DEQ shall use its best efforts, but not be obligated, to provide reasonable advance notice before entering the facility. DEQ shall adhere to all health and safety requirements of the facility, as identified in the applicable Health and Safety Plan, including, but not limited to, requirements in portions of the Site where outside visitors must be accompanied by company personnel.

2. Brix shall permit DEQ to inspect and copy all records, files, photographs, documents, and data in connection with work under this Agreement, except that Brix shall not be required to permit DEQ inspection or copying of items subject to attorney-client or attorney work product privilege. DEQ shall use its best efforts, but not be obligated, to provide reasonable notice before records inspection and copying requests.

3. Attorney-client and work product privileges may not be asserted with respect to any records required under Paragraphs II.G.1 and II.G.2 of this Agreement. Brix shall identify to DEQ--by addressor-addressee, date, general subject matter, and distribution--any document, record, or item withheld from DEQ on the basis of attorney-client or attorney work product privilege. DEQ reserves its rights under law to obtain documents DEQ asserts are improperly withheld by Brix.

D. **Project Managers**

1. To the extent possible, all reports, notices, and other communications required under or relating to this Agreement shall be directed to:

DEQ Project Manager:	Brix Project Managers:
Rodney Struck Voluntary Cleanup Program Oregon DEQ 2020 SW Fourth Avenue, Suite 400 Portland, Oregon 97201-4987 Phone: (503) 229-5562 FAX: (503) 229-6899 email: rodney.struck@deq.state.or.us	John Edwards David Templeton Anchor Environmental, Inc. 1411 4th Avenue, Suite 1210 Seattle, WA 98101 Phone: (206) 287-9130 FAX: (206) 287-9131 email: jedwards@anchorenv.com

email: dtempleton@anchorenv.com

with a copy to:

Kim Maree Johannessen, Esq.
Johannessen & Associates, P.S.
5413 Meridian Ave. N., Suite C
Seattle, WA 98103
Phone: (206) 632-2000
FAX: (206) 632-2500
email: kmj@johanassocs.com

2. Brix's and DEQ's Project Managers shall be available and have the authority to make day-to-day decisions necessary to complete the Scope of Work under this Agreement.

E. Notice and Samples

Brix shall make every reasonable attempt to notify DEQ of any excavation, drilling, or sampling to be conducted under this Agreement at least five (5) working days before such activity but in no event less than twenty-four (24) hours before such activity. Upon DEQ's verbal request, Brix shall make available to DEQ a split or duplicate of any sample taken pursuant to this Agreement. DEQ shall make every effort to complete analysis of any split or duplicate sample on a schedule consistent with Brix's schedule for related activities. DEQ shall provide Brix with copies of all analytical data from such samples as soon as practicable.

F. Quality Assurance

Brix shall conduct all sampling, sample transport, and sample analysis in accordance with the Quality Assurance/ Quality Control (QA/QC) provisions approved by DEQ as part of the work plan. All plans prepared and work conducted as part of this Agreement shall be consistent with DEQ's "Quality Assurance Policy No. 760.00". Brix shall ensure that each laboratory used by Brix for analysis performs such analyses in accordance with such provisions.

G. Records

1. In addition to those technical reports and documents specifically required under this Agreement, Brix shall provide to DEQ within thirty (30) days of DEQ's written request copies of documents generated in connection with the work required under this Agreement, including QA/QC memoranda and QA/QC audits, draft and final deliverable plans, final reports, task memoranda, field notes, and laboratory analytical data that have undergone data quality validation.

2. If DEQ determines that review of raw data or preliminary laboratory reports is necessary in order to ensure protection of public health, safety, and welfare and the environment,

that information will be provided by Brix within ten (10) days of DEQ's written request.

3. Brix and DEQ shall preserve all records and documents in possession or control of Brix and DEQ, respectively, or their employees, agents, or contractors that relate in any way to activities under this Agreement for at least five (5) years after termination under Subsection II.R. of this Agreement; provided that after such 5-year period, Brix and DEQ shall provide the other sixty (60) days notice before destruction or other disposal of such records and make them available for inspection and copying.

4. Brix may assert a claim of confidentiality regarding any documents or records submitted to or copied by DEQ pursuant to this Agreement. DEQ shall treat documents and records for which a claim of confidentiality has been made in accordance with ORS 192.410 through 192.505. If Brix does not make a claim of confidentiality at the time the documents or records are submitted to or copied by DEQ, the documents or records may be made available to the public without notice to Brix.

H. Progress Reports

During each quarter of this Agreement, Brix shall deliver to DEQ on or before the fifteenth (15th) day following the end of the calendar quarter two (2) copies of a progress report containing the following items. DEQ anticipates that the progress report will not exceed 2 pages in length.

1. Actions taken under this Agreement during the previous quarter;

2. Actions scheduled to be taken in the next quarter;

3. Sampling, test results, and any other data generated by Brix during the previous quarter; and

4. A description of any problems experienced during the previous quarter and the actions taken to resolve them.

I. Other Applicable Laws

Subject to ORS 465.315(3), all actions under this Agreement shall be performed in accordance with all applicable federal, state, and local laws and regulations. Without limiting the foregoing, all action under this Agreement shall be performed in accordance with any applicable federal, state and local laws and regulations related to archeological objects and sites and protection thereof. If archeological objects or human remains are discovered during any investigation, removal or remedial activities at the Site, Brix shall, at a minimum, (a) stop work immediately in the vicinity of the find, (b) provide any

notifications by ORS 97.745 and ORS 358.920, (c) notify Kim Cox, Portland Harbor Project Coordinator at (503) 229-6590 or the DEQ project manager for the Brix site within 24 hours of the discovery, and (d) use best efforts to ensure that Brix and its employees, contractors, counsel and consultants keep the discovery confidential, including but not limited to, refraining from contacting the media or any third party or otherwise sharing information regarding the discovery with any member of the public, and immediately notifying DEQ of and directing any inquiry from the media or pubic regarding the discovery to DEQ.

J. Reimbursement of DEQ Oversight Costs

1. Prior to entry of this Agreement, DEQ shall submit to Brix an estimate of costs incurred by DEQ to date for site assessment activities and preparation and negotiation of this Agreement. Upon entry of this Agreement, DEQ shall submit to Brix an invoice for costs actually and reasonably incurred by DEQ prior to entry of this Agreement for site assessment activities and preparation and negotiation of this Agreement and an estimate of future DEQ oversight costs associated with Brix's implementation of this Agreement. DEQ's invoice for direct costs will include a direct labor summary showing the persons charging time, the amount of time, and the nature of the work performed.

2. DEQ shall submit to Brix a monthly statement of costs incurred after issuance of this Agreement by DEQ in connection with oversight of Brix's implementation of this Agreement. Each invoice will include a summary of costs billed to date. DEQ's invoices for direct costs will include a direct labor summary showing the persons charging time, the amount of time, and the nature of the work performed.

3. DEQ or State of Oregon oversight costs payable by Brix shall include both direct and indirect costs. Direct costs shall include site-specific expenses, DEQ contractor costs, and DEQ legal costs. Indirect costs shall include those general management and support costs of the DEQ and of the applicable administering division (e.g. Waste Prevention and Management Division, Environmental Cleanup Division, Northwest Region) that are allocable to DEQ oversight of this Agreement and not charged as direct, site-specific costs. Indirect costs shall be based on a percentage of direct personal services costs. DEQ oversight costs also shall include the surcharge required by ORS 465.333.

4. Within thirty (30) days of receipt of a DEQ statement, Brix shall pay the amount of costs billed by check made payable to the "State of Oregon, Hazardous Substance Remedial Action Fund". Brix shall pay simple interest of 9% per annum on the unpaid balance of any oversight costs, which interest shall begin to accrue at the end of the 30-day payment period.

K. **Force Majeure**

1. If any event occurs that is beyond Brix's reasonable control and that causes or might cause a delay or deviation in performance of the requirements of this Agreement, Brix shall promptly notify DEQ's Project Manager verbally of the cause of the delay or deviation and its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Brix proposes to carry out such measures. Brix shall confirm in writing this information within five (5) working days of the verbal notification.

2. If Brix demonstrates to DEQ's satisfaction that the delay or deviation has been or will be caused by circumstances beyond the reasonable control and despite the due diligence of Brix, DEQ shall extend times for performance of related activities under this Agreement as appropriate. Circumstances or events beyond Brix's control might include but are not limited to acts of God, unforeseen strikes or work stoppages, fire, explosion, riot, sabotage, or war. Increased cost of performance or changed business or economic circumstances shall be presumed not to be circumstances beyond Brix's reasonable_control.

L. **Prior Approval**

Where DEQ review and approval is required for any plan or activity under this Agreement, Brix shall not proceed to implement the plan or activity until DEQ approval is received. Any DEQ delay in granting or denying approval shall correspondingly extend the time for completion by Brix. Prior approval shall not be required in emergencies where Brix reasonably believes a delay in undertaking a particular action will threaten human health, safety, or the environment; provided that Brix notifies DEQ of the emergency and action as soon as is practicable.

M. **Dispute Resolution**

In the event of disagreement between Brix and DEQ regarding implementation of this Agreement, Brix and DEQ shall, in the following order: 1) make a good faith effort to resolve the dispute between technical Project Managers; 2) if necessary, refer the dispute for resolution by the immediate supervisors of the Project Managers; 3) if necessary, provide each other their respective positions in writing and refer the dispute for resolution by DEQ's Administrator of the Land Quality Division or the Northwest Region Administrator and Brix's Regional Director; and 4) if necessary, refer the dispute for resolution by DEQ's Director and Brix's President. Brix shall have the right to have counsel present during any dispute resolution meetings between DEQ and Brix. DEQ's final decision after such dialogue shall be

enforceable under this Agreement. The time required for dispute resolution shall correspondingly extend Brix's schedule for all pending, affected deliverables or activities.

N. Enforcement of Agreement and Reservation of Rights

1. In the event of Brix's failure to comply with this Agreement (including any failure to reimburse oversight costs), DEQ may enforce this Agreement as an order under ORS 465.260(5) or may terminate this Agreement after thirty (30) days written notice to Brix.

2. In the event of DEQ's failure to provide oversight in accordance with this Agreement, Brix may terminate this Agreement after thirty (30) days written notice to DEQ. Costs incurred or obligated by DEQ before the effective date of any termination of this Agreement shall be owed under the Agreement notwithstanding such termination.

3. Brix does not admit any facts (including those recited herein), legal issues, liability, or violation of law by virtue of entering this Agreement.

4. Except as otherwise provided in Subsection II.O., nothing in this Agreement shall prevent Brix from exercising any rights of contribution or indemnification Brix might have against any person, including the State of Oregon, regarding the release(s) of hazardous substances that are the subject of this Agreement; provided Brix waives any right it might have under ORS 465.260(7) to seek reimbursement from the Hazardous Substance Remedial Action Fund for costs incurred under this Agreement.

5. Brix agrees not to litigate, in any proceeding brought by DEQ to enforce this Agreement, any issue other than Brix's or DEQ's compliance with this Agreement.

6. The Brix site is part of the Portland Harbor, which was listed on the federal National Priority List (NPL) in December 2000. DEQ remains the lead agency with respect to the Brix site. If EPA orders any conflicting or overlapping activities, this Agreement shall be modified, as necessary, to prevent conflicting or duplicative obligations. Any other additional EPA-imposed obligations may be addressed by modification of this Agreement under Subsection II.Q. or by separate agreement or order.

O. Hold Harmless

1. Brix shall save and hold harmless the State of Oregon and its commissions, agencies, officers, employees, contractors, and agents, and indemnify the foregoing, from and against any and all claims arising from acts or omissions related to this

Agreement of Brix or its officers, employees, contractors, agents, receivers, trustees, or assigns. DEQ shall not be considered a party to any contract made by Brix or its agents in carrying out activities under this Agreement.

2. To the extent permitted by Article XI, Section 7, of the Oregon Constitution and by the Oregon Tort Claims Act, the State of Oregon shall save and hold harmless Brix and its officers, employees, contractors, and agents, and indemnify the foregoing, from and against any and all claims arising from acts or omissions related to this Agreement of the State of Oregon or its commissions, agencies, officers, employees, contractors, or agents (except for acts approving or omissions constituting approval of any activity of Brix under this Agreement). Brix shall not be considered a party to any contract made by DEQ or its agents in carrying out activities under this Agreement.

P. Parties Bound

This Agreement shall be binding on the parties and their respective successors, agents, and assigns. The undersigned representative of each party certifies that he or she is fully authorized to execute and bind such party to this Agreement. No change in ownership or corporate or partnership status relating to the facility shall in any way alter Brix's obligations under this Agreement, unless otherwise approved in writing by DEQ.

Q. Modification

DEQ and Brix may modify this Agreement by mutual written agreement.

R. Duration and Termination

Upon completion of work under this Agreement, Brix shall submit to DEQ a written notice of completion. This Agreement shall be deemed satisfied and terminated upon payment of all oversight costs owed and upon DEQ's issuance of a letter acknowledging satisfactory completion of activities in accordance with this Agreement. Such letter shall be issued within sixty (60) days of receipt of notice of completion evidencing satisfactory completion of activities in accordance with this Agreement and payment of outstanding DEQ oversight costs, or as soon thereafter as is reasonably practicable. In the event that DEQ is unable to issue such letter within sixty days of receipt of Brix's written notice of completion, DEQ shall provide Brix with a written schedule upon which DEQ anticipates review of Brix's work and issuance of that letter.

BRIX MARITIME COMPANY

By: _____ Date: 5.1.02
(Name)

Regional Director
(Title)

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

By: _____ Date: 5/8/2002
(Name)

Acting D.A.
(Title)

KBB/GEN30415

Attachment A

ANCHOR

10/04/00 BRX002a-01.DWG 99-056-01

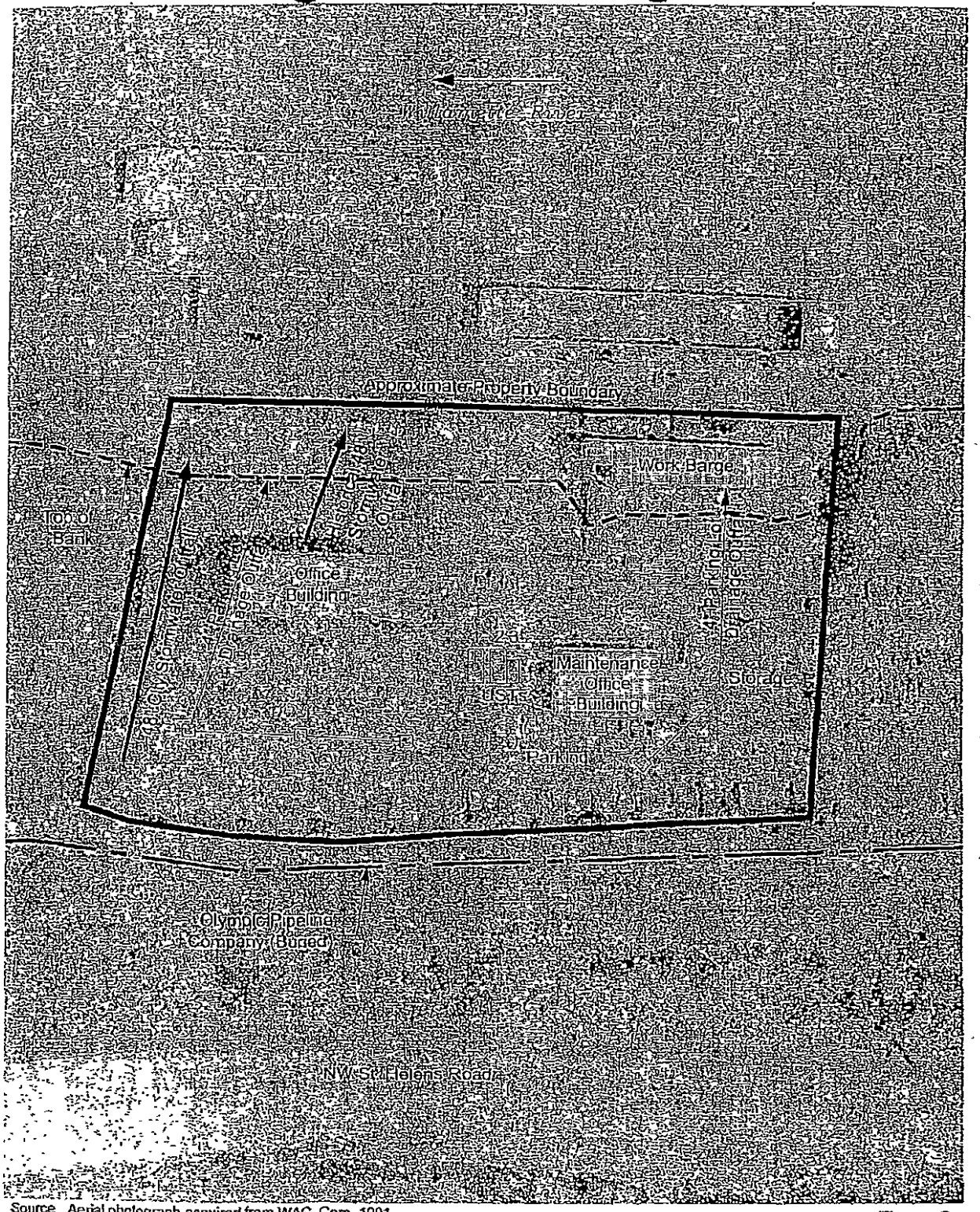
0 1300

Scale in Feet

Source: Aerial photograph acquired from the Metro Data Resource Center, Oregon, 1997.

Figure 1
Site Location

Attachment A



Source: Aerial photograph acquired from WAC, Corp. 1991.

Figure 2
Site Map

ANCHOR ENVIRONMENTAL, L.L.C.

0 100
Scale In Feet

10/04/00 BRX002c-01.dwg 99-056-01

ODEQ200048648

ATTACHMENT B

SCOPE OF WORK FOR
REMEDIAL INVESTIGATION AND SOURCE CONTROL MEASURES

I. SCHEDULE

Respondent shall submit for DEQ review and approval Remedial Investigation (RI), Risk Assessment (RA), and Source Control Measures (SCM) work plans and reports which address all elements of this Scope of Work (SOW). Elements of the SOW may be addressed by alternative means or by using existing data or information to the extent that the data are applicable, meet the objectives of the RI, and are of acceptable QA/QC.

All work completed under this Agreement shall proceed in accordance with the schedule below:

RI Assessment Work Plan (if Respondent elects to perform a Pre-RI Assessment)	A Pre-RI Assessment Work Plan will be submitted to DEQ within 15 days of the issuance of this Agreement.
DEQ Review and Comment	To Respondent within 15 days of receipt of Pre-RI Assessment Work Plan.
Pre-RI Assessment Report	To be specified in Pre-RI Assessment Work Plan.
RI Proposal	An RI proposal will be submitted to DEQ within 30 days of issuance of this Agreement or, if a Pre-RI Assessment is performed and DEQ determines that an RI is necessary, based on the results of a Pre-RI Assessment, within 30 days of approval of the Pre-RI Assessment Report.
DEQ Review and Comment	To Respondent within 30 days of receipt of RI Proposal.
Draft RI Work Plan	To DEQ within 30 days of receipt of DEQ comments on RI Proposal.
DEQ Review and Comment	To Respondent within 30 days of receipt of draft RI Work Plan.
Final RI Work Plan	To DEQ within 30 days of receipt of DEQ comments on draft RI Work Plan.
Initiation of RI	To be specified in Project Management section of RI Work Plan.
Initiation of SCM	To be specified in Project Management section of RI Work Plan.

The schedule for additional deliverables specified in this SOW (e.g., Risk Assessment work plan, Remedial Investigation report, Risk Assessment report, and Source Control Measure work plan) should be specified in the Project Management Plan section of the RI work plan.

All work plans may be amended by Respondent as necessary to reflect or incorporate newly discovered information and/or environmental conditions. Additional work plans and work plan amendments are subject to DEQ review and approval and shall be processed according to schedules negotiated between the parties at the time of each phase change or task addition. Respondent shall initiate and complete work according to the schedule specified in the applicable approved work plan or amendment. Future schedules or deadlines for all submittals, work plans or other requirements shall be adjusted accordingly for the time necessary for preparation, approval and implementation of additional work plans, investigations and/or reports not contemplated in the original schedule and shall be approved by DEQ in writing.

II. OBJECTIVES

Work performed under this Agreement shall complement and incorporate existing facility information with the following specific objectives. For purposes of this Scope of Work, the "facility" shall exclude that portion of the facility that is below the mean high-water mark of the Willamette River. The parties acknowledge that a separate Portland Harbor Sediment RI/FS is proceeding with respect to the portion of the Willamette River below the mean high-water mark, and it is not the purpose of this Scope of Work to duplicate any of that work:

A. Identify and characterize all hazardous substance source areas at the **Brix Maritime** facility. Source areas shall be characterized through a review of historical information and the collection of environmental samples for chemical, geotechnical, and other analyses. The evaluation of source areas shall focus on upland operations that may have resulted in a release of hazardous substances.

B. Evaluate all contaminant migration pathways at the **Brix Maritime** facility. Key elements relevant to contaminant migration include, but are not limited to, the rate and direction of groundwater flow, subsurface contaminant migration to the Willamette River, overland contaminant migration to the Willamette River, storm water discharge to the Willamette River, direct and indirect release to the Willamette River, preferential migration pathways, volatilization, dust entrainment, and riverbank seepage.

C. Determine the nature, extent, and distribution of hazardous substances in affected media at the **Brix Maritime** facility. This analysis should focus on the vertical and horizontal extent of source area contamination, groundwater contamination, and surface and subsurface soil contamination.

D. Identify all current and reasonably likely future human and ecological receptors at the **Brix Maritime** facility. Receptors shall include human and ecological receptors that may be exposed to hazardous substances at the facility. This analysis should consider all relevant contaminant migration pathways and the nature, extent and distribution of hazardous substances in affected media.

E. Collect sufficient data and historical information to allow the identification of possible areas of sediment contamination adjacent to the **Brix Maritime** facility. Areas of potential sediment contamination shall be characterized through the Portland Harbor Sediment RI/FS. Data collection and evaluation shall consider the potential for contaminant migration to the Willamette River and over or in-water releases of hazardous substances resulting from operations at the **Brix Maritime** facility. Respondent may be required to perform limited sediment or benthic sampling adjacent to the facility as necessary to address an objective of this Scope of Work but will not be required to conduct sediment or benthic sampling that is duplicative of sampling under the Portland Harbor sediment RI/FS.

F. Evaluate the risk to human health and the environment from releases of hazardous substances at or from the **Brix Maritime** facility through the performance of human health and ecological risk assessments.

G. Identify hot spots of contamination, if any, at the **Brix Maritime** facility.

H. Generate or use data of sufficient quality for site characterization and risk assessment at the **Brix Maritime** facility.

I. Develop the information necessary to evaluate and design necessary source control measures to address contaminant releases from the **Brix Maritime** facility.

J. Implement necessary source control measures to address contaminant releases from the **Brix Maritime** facility.

III. Pre-RI Assessment Work Plan and Report

Respondent may elect to perform a Pre-RI Assessment as the initial task under this Agreement. The primary purpose of the Pre-RI assessment is to determine which media and pathways (e.g., groundwater, surface water, air, and direct contact) are affected by site related hazardous substances. The Pre-RI Assessment will include a review of the facility history, review of current facility conditions, and may include focused sampling activities, to assess potential past and

present sources of hazardous substances and determine if there has been a release from these sources to surface water or sediments, as appropriate.

If Respondent elects to perform a Pre-RI Assessment, Respondent shall submit a Pre-RI Assessment Work Plan for DEQ review and approval. The Pre-RI Assessment Work Plan shall describe the objectives, deliverables, schedule, and specific tasks that will be performed for the Pre-RI Assessment. If the Pre-RI Assessment includes sampling, the work plan shall describe the sampling locations and the methodologies that will be used for the sampling and analysis.

The Pre-RI Assessment report will present the results of the Pre-RI Assessment including figures and tables presenting the results of any sampling and analysis. The report will present conclusions regarding the likelihood of past or present source(s) and pathway(s) for the release of hazardous substances to sediments adjacent to Respondent's facility and whether a re-evaluation of the priority of Respondent's facility is appropriate.

The results of the Pre-RI Assessment shall be used to determine whether further action is needed to assure protection of present and future public health, safety and welfare, or the environment. No further work shall be required under this Agreement and SOW if, based on historical information and the results of the Pre-RI Assessment or subsequent facility investigation, DEQ reasonably determines that there is no likely present source and pathway for the release of hazardous substances to surface water or sediments at or from Respondent's facility for which DEQ could require a removal action or remedial investigation under ORS 465.200 et seq. Further, should the pre-RI assessment or subsequent facility investigation provide enough information to re-evaluate the priority of the facility, Respondent may request that DEQ perform this evaluation. Should it be determined by DEQ that the facility no longer presents a high priority threat to present and future public health, safety, and welfare or the environment, no further RI work with respect to the uplands portions of the facility shall be required under this Agreement and SOW.

IV. REMEDIAL INVESTIGATION PROPOSAL

If DEQ determines that further RI work is required (or if Respondent elects not to perform a Pre-RI Assessment), Respondent shall prepare an RI proposal. The RI Proposal shall briefly discuss Respondent's proposed approach to the RI, addressing soil, groundwater, surface water, sediments, and air. The proposal will provide the framework for the RI Work Plan and will include at a minimum, a summary of data collected to date, a conceptual site model (including a conceptual site hydrogeologic model), a description of RI goals and objectives and an estimated schedule for completion of the RI. The RI proposal shall consider methodologies presented in the Portland Harbor Sediment Management Plan and the Portland Harbor Sediment Investigation Work Plan.

V. REMEDIAL INVESTIGATION WORK PLAN

The work plan shall be developed in accordance with applicable Oregon Administrative Rules (OAR 340-122-010 through -115), DEQ guidance, and the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01, 1988, as appropriate. Existing data may be used if it meets data quality objectives for the RI. The results of the RI shall be utilized to guide data collection efforts performed as part of the Portland Harbor RI/FS Work Plan. The need for the RI Work Plan shall be evaluated based on the results of the pre-RI Assessment. The submitted work plan shall include, but not be limited to the following items:

A. PROJECT MANAGEMENT PLAN

The RI Work Plan shall include a proposed schedule for submittals and implementation of all proposed activities and phases pertaining to this scope of work (this schedule will include target dates for the submittal of a Risk Assessment work plan, and submittal of draft and final Remedial Investigation, and Risk Assessment reports); a description of the personnel (including subcontractors, if known) involved in the project, and their respective roles in the project; and a discussion of how variations from the approved work plan will be managed.

B. SITE DESCRIPTION

The RI work plan shall include a discussion of the current understanding of the physical setting of the facility and surrounding area; the facility history; hazardous substance and waste management history; facility operations conducted on, in, over or adjacent to the Willamette River and current facility conditions.

C. SITE CHARACTERIZATION PLAN

The Site Characterization plan shall be consistent with DEQ guidance and the requirements specified in OAR 340-122-080. The site characterization plan shall include, but not be limited to, characterization of the hazardous substances, characterization of the facility, identification of potential receptors and the collection and evaluation of information relevant to the identification of hot spots of contamination, and shall address the following:

1. **Soils**

Objective: To identify and characterize releases of hazardous substances from the facility to soils.

Scope: The plan shall supplement previous soil sampling at the facility. The plan shall address all areas of the

facility which could potentially have received spills, leaks from tanks or piping, been used for waste treatment or disposal, or have been affected by contaminated surface water or storm water runoff, and all other areas of the facility where soil contamination is known or suspected.

Procedures: The plan shall be designed and conducted to determine the vertical and lateral extent of soil contamination, determine the extent to which soil contamination may contribute to Willamette River sediment contamination, characterize the facility geology, determine the physical and chemical soil characteristics relevant to the RI, evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing soil.

2. **Groundwater**

Objective: To identify and characterize releases of hazardous substances from the facility to groundwater.

Scope: The plan shall supplement previous investigations at the facility and shall identify and characterize all past, current and potential releases of hazardous substances to groundwater from the facility.

Procedures: The plan shall be designed and conducted to determine the vertical and lateral extent of groundwater contamination, both on and, if applicable, off-site; estimate the rate of contaminant flux to the Willamette River; determine the extent to which free phase product is migrating to the Willamette River; characterize the facility hydrogeology, determine the physical and chemical water bearing zone characteristics relevant to the RI; evaluate the potential for contaminant migration through groundwater; and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing groundwater. Alternative methods for characterizing groundwater should be considered to accelerate the RI. Monitoring wells and other holes must be drilled, constructed and decommissioned in accordance with OAR Chapter 690, Division 240 and DEQ "Ground Water Monitoring Well, Drilling, Construction and Decommissioning" guidelines (DEQ 1992).

3. **Surface Water**

Objective: To identify and characterize releases of hazardous substances from the facility to surface water.

Scope: The plan shall supplement previous investigations at the facility and shall identify and characterize all past,

current, and potential impacts to surface waters from the facility.

Procedures: The plan shall be designed to determine the extent to which surface water may have been impacted by releases of hazardous substances at the facility; determine the nature and extent of surface water contamination; characterize the facility hydrology; determine the physical and chemical surface water characteristics relevant to the RI including flow characteristics; evaluate the potential for contaminant migration and gather the information necessary to identify hot spots of contamination. The plan shall include the proposed methodology for characterizing surface water.

4. **Sediments**

Objective: To identify and characterize releases of hazardous substances from the facility to sediments.

Scope: The plan shall supplement previous investigations at the facility, shall identify and characterize all past, current, and potential releases of hazardous substances to sediments from the facility in a manner consistent with the Portland Harbor Sediment RI/FS. Characterization of the nature and extent of sediment contamination shall not be subject to this Agreement, but is contemplated to be completed through the Portland Harbor Sediment RI/FS.

Procedures: The plan shall be designed to identify sources of sediment contamination from the facility, and characterize release mechanisms from the facility to sediments. The plan shall include the proposed methodology for characterizing releases to sediments and as applicable shall utilize methodologies presented in the Portland Harbor Sediment Management Plan and the Portland Harbor Sediment Remedial Investigation and Feasibility Study Work Plan.

5. **Air**

Objective: To identify and characterize any unpermitted release of hazardous substances to the air, from soil, surface water, or groundwater contamination at the facility.

Scope: The plan shall supplement previous investigations at the facility and shall identify and characterize all past, current and potential releases (e.g. contaminated soil or groundwater) of hazardous substances to air.

Procedures: The plan shall include the proposed methodology for evaluating air emissions using appropriate emission calculations and/or a field sampling program. The plan shall be designed to delineate the nature and extent of contamination, characterize the site climatology, determine

the physical and chemical air characteristics relevant to the RI, evaluate the potential for contaminant migration to the Willamette River and surrounding areas and gather the information necessary to identify hot spots of contamination.

6. **Identification of Current and Reasonably Likely Future Land and Water Use**

Objective: To identify current and reasonably likely future land and water uses in the locality of the facility not including those of the Willamette River.

Scope: The plan shall be designed to identify current and reasonably likely future land and water uses for the purposes of identifying hot spots of contamination and conducting the baseline human health and ecological risk assessments based on OAR 340-122-080, DEQ Guidance, and the Portland Harbor Sediment Management Plan.

Procedures: The plan shall include the proposed methodology for identifying current and reasonably likely future land and water uses in the locality of the facility.

D. SAMPLING AND ANALYSIS PLAN (SAP)

Objective: To adequately document all sampling and analysis procedures.

Scope: In preparation of the SAP, the following guidance documents shall be utilized: Data Quality Objectives for Remedial Response Activities, EPA/540/G-87/004 (OSWER Directive 9355.0-7B), March, 1987; Test Methods for Evaluating Solid Waste, SW-846; and A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001 (OSWER Directive 9355.0-14), December, 1987. The SAP shall address all topics listed in Environmental Cleanup Division Policy #760.000, Quality Assurance Policy.

Procedures: The work plan shall include a sampling and analysis plan (SAP). The SAP shall include quality assurance and quality control (QA/QC) procedures for both field and lab procedures. The SAP shall be sufficiently detailed to function as a manual for field staff.

E. HEALTH AND SAFETY PLAN (HASP)

Objective: To establish policies and procedures to protect workers and the public from the potential hazards posed by a hazardous materials site.

Scope: The HASP portion of the work plan shall comply with 29 CFR 1910.120 and OAR Chapter 437, Division 2.

Procedures: The HASP shall include a description of risks related to RI activities, protective clothing and equipment, training, monitoring procedures, decontamination procedures and emergency response actions.

F. MAPS

The work plan shall include a map or maps of the facility, which clearly shows facility topography, on-site structures, waste disposal areas and proposed sampling locations.

VI. EVALUATION AND IMPLEMENTATION OF SOURCE CONTROL MEASURES

Objective: To implement necessary source control measures to address contaminant migration to the Willamette River that warrants removal action under OAR 340-122-070.

Scope: The plan shall gather sufficient information to evaluate, design and implement necessary source control measures.

Procedures: The plan shall be designed to and conducted to characterize all release mechanisms to the Willamette River. Characterization data shall be adequate to evaluate, design and implement necessary source control measures. Source control measures shall address contaminant migration to the river through overland transport, storm water runoff, free phase product migration, direct release, and/or dissolved groundwater contaminant migration that warrant removal action under OAR 340-122-070.

Termination: Respondent's obligations with respect to any source control measures implemented under this SOW shall terminate upon implementation of a remedy or entry of a consent decree, unilateral order, or other order that requires remedial action with respect to the facility that effectively serves to control that source.

VII. RISK ASSESSMENT WORK PLAN

A. UPLAND HUMAN HEALTH RISK ASSESSMENT PLAN

Objective: To evaluate the collective demographic, geographic, physical, chemical, and biological factors at the facility, for the purposes of characterizing current or reasonably likely future risks to human health as a result of a threatened or actual release(s) of a hazardous substance at or from the facility; documenting the magnitude of the potential risk at the facility; supporting risk management decisions; and establishing remedial action goals if necessary.

Scope: The human health risk assessment shall evaluate risk in the context of current and reasonably likely future land and water uses and in the absence of any actions to

control or mitigate these risks (i.e., under an assumption of no action). The human health risk assessment portion of the work plan shall be developed based on the requirements specified in OAR 340-122-084, DEQ guidance, and the Risk Assessment Guidance for Superfund - Human Health Evaluation Manual Part A, United States Environmental Protection Agency (EPA) Interim Final, July 1989 (RAGS-HHEM). A suggested outline for the human health evaluation is given in Exhibit 9-1 of the RAGS-HHEM. The work plan should use this outline as a framework for discussing the methodologies and assumptions to be used in assessing the potential human health risks at the facility.

Procedure: The plan shall describe the different tasks involved in preparing the human health risk assessment. The human health risk assessment can be completed using either deterministic or probabilistic methodologies. If probabilistic methodologies are to be used, then Respondent shall discuss risk protocol with DEQ before the commencement of a probabilistic risk assessment.

The upland human health risk assessment shall be designed to achieve the following:

1. Develop appropriate exposure units considering the nature, extent, and distribution of contamination and the reasonably likely future land and water use in the locality of the facility;
2. Establish data quality objectives for each exposure unit identified;
3. Collect data appropriate to satisfy the data quality objectives for each exposure unit;
4. Identify contaminants of interest for each media of concern;
5. Develop exposure scenarios based on current and reasonably likely land use, facility features and populations potentially exposed;
6. Identify appropriate exposure factors for all exposure pathways to be evaluated;
7. Identify the appropriate toxicity factors for all exposure pathways to be evaluated; and
8. Quantify the risks to human health at the facility.

B. UPLAND ECOLOGICAL RISK ASSESSMENT PLAN

Objective: To evaluate the collective demographic, geographic, physical, chemical, and biological factors at the facility, for the purposes of characterizing current or reasonably likely future risks to the environment as a result of a threatened or actual release(s) of a hazardous substance at or from the facility; quantifying the potential risk at a facility; supporting risk management decisions; and establishing remedial action goals if necessary.

Scope: The ecological risk assessment shall evaluate risk in the context of current and reasonably likely future land and water uses and in the absence of any actions to control or mitigate these risks (i.e., under an assumption of no action). The ecological risk assessment will use a tiered approach (with four levels) to produce a focused and cost-effective assessment of risk. The ecological risk assessment work plan shall be developed based on the requirements specified in rule under OAR 340-122-084 and DEQ guidance.

Procedure: The plan shall describe the different tasks involved in preparing the ecological risk assessment. Ecological risk assessments may include a level I scoping plan; a level II screening plan; a level III baseline plan; and a level IV field baseline plan. The level III and level IV baseline plans shall include an exposure analysis, an ecological response analysis, a risk characterization and an uncertainty analysis as required by OAR 340-122-084(3). The ecological risk assessment can be completed using either deterministic or probabilistic methodologies. If probabilistic methodologies are to be used, then Respondent shall discuss risk protocol with DEQ before the commencement of a probabilistic risk assessment.

Terrestrial habitats and receptors shall be evaluated through the following approach:

1. Complete a Level I Scoping assessment per ODEQ guidance for the terrestrial portion of the facility.
2. Make a preliminary determination of locality of the facility with respect to terrestrial receptors and current and potential future exposure to facility-related contaminants.
3. Determine potential for presence/absence of terrestrial threatened or endangered species.

VIII. REPORTS

A. QUARTERLY REPORTS

Two (2) copies of the Quarterly Reports shall be submitted to DEQ by the 15th day of the quarter following the reporting period. The quarterly reports shall summarize activities performed, data results collected or received and problems encountered or resolved during the previous quarter and activities planned for the upcoming quarter.

B. REMEDIAL INVESTIGATION REPORT

The Remedial Investigation report shall follow the outline in Table 3-13 (page 3-30 - 3-31) in the CERCLA RI/FS guidance, as applicable, and address the items listed below:

1. Executive Summary.

2. Introduction.

3. Facility Background.

A discussion and supporting maps of facility operations, facility description, facility setting, and current and reasonably likely future land and water uses.

4. Study Area Investigation.

A discussion of the investigative procedures and results for soil, groundwater, surface water, sediments and air.

5. Summary and Conclusions.

A discussion of the nature, extent, distribution and environmental fate and transport of contaminants in soil, groundwater, surface water, sediments and air.

6. Appendices.

Detailed information supporting the results of the Remedial Investigation shall be submitted in the Appendices of the report.

C. RISK ASSESSMENT REPORT

1. Human Health Risk Assessment Report

The results of the human health risk assessment should follow DEQ risk assessment guidance for human health and RAGS-HHEM Part A.

2. Ecological Risk Assessment Report

The main sections of the ecological risk assessment report should follow specific DEQ guidance for report formats at each level (I-III).

D. REPORT DISTRIBUTION.

1. Three (3) bound copies and one (1) unbound copy of all reports should be submitted to DEQ.

2. DEQ requests that all copies be duplex printed on recycled paper.

REMEDIAL INVESTIGATION WORK PLAN

BRIX MARITIME COMPANY
PORTLAND, OREGON

Prepared for
Brix Maritime Company

Prepared by
Anchor Environmental, L.L.C.
6650 SW Redwood Lane, Suite 110
Portland, OR 97224

November 26, 2003

3 REMEDIAL INVESTIGATION STATUS

3.1 Soil

Table 1 is a summary of push probe locations conducted during May 2001 and includes field observations for borings B-14 through B-30. Table 2 is a spreadsheet of all of the soil quality data obtained to date at the site. The samples from Borings B-2 through B-13 were obtained in 1993 and Borings B-14 through B-30 were completed during the expanded Preliminary Assessment as reported by Anchor, September, 2001. Selected soil samples were also obtained from the monitoring well borings, as described in the RI quarterly reports. Table 2 shows that TPH analyses were run on soil samples from the 1993 borings. Select soil samples from borings B-16 through B-30, and the soil samples collected during monitoring well installation were tested for TPH, PAHs, and lead. The locations of the soil borings are shown on Figure 3 and the locations of the monitoring well borings are shown on Figure 5. The TPH soil data are shown on Figure 4. The September 2001 Preliminary Assessment report contains a description of the nature and extent of soil contamination from petroleum hydrocarbons and related chemicals.

As a preliminary evaluation of potential risk to site occupational workers and future construction/excavation workers, the soil data in Table 2 are screened against the recently promulgated generic risk-based cleanup concentrations (RBCs) issued by the Oregon DEQ in Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites, September 22, 2003. The last column of Table 2 lists the most conservative RBC for the following potential exposure pathways, where appropriate.

- Occupational RBC for vapor intrusion into buildings
- Construction worker RBC for soil ingestion, dermal contact, inhalation
- Occupation RBC for soil ingestion, dermal contact, inhalation

This preliminary risk screen is done to identify if there are any significant soil data gaps with respect to potential upland human health exposure pathways. Review of Table 2 shows that there are only three samples that exceeded the conservative generic RBCs applied to this site. The three samples are highlighted on Table 2.

The soil sample taken at the five-foot depth at boring B-21 had a benzene concentration of 5.2 mg/kg, exceeding the 1.2 mg/kg soil to indoor air generic RBC. Boring B-21 was located next to the former gasoline dispenser. Benzene was not detected in any of the other 15 samples tested from the site.

Benzo-a-pyrene was detected in soil at depths between 22.5 and 26 feet below ground surface, which is too deep for any possible exposure to site occupational workers. Benzo-a-pyrene concentrations of 0.92 and 0.44 mg/kg were detected in deep soil samples from monitoring wells borings MW-5 and MW-6. These concentrations exceed the 0.27 mg/kg generic occupational RBC for soil ingestion, dermal contact, and inhalation. However, these concentrations are not significant, because there is no complete exposure pathway for site workers at the depth of these samples.

Because the site soils are completely covered with pavement, buildings, or rip-rap slope protection, there is no complete pathway for soil erosion and transport to the Willamette River.

Considering all of the soil data represented on Table 2, the existing soil quality database adequately characterizes soil quality at the site for the purpose of evaluating potential source controls to protect the Willamette River. There may be a potential data gap with respect to the soil benzene pathway to indoor air; however, that pathway does not affect the river source control evaluation that is the focus of this remedial investigation. For these reasons the existing soil quality database is considered complete and no further soil testing is planned for this remedial investigation.

3.2 Groundwater

As described in the quarterly reports, a groundwater monitoring network consisting of wells MW-1 through MW-7 has been established during the RI. The monitoring well locations were selected during successive stages of the investigation and each location was reviewed with DEQ, and approved prior to installation. The seven monitoring well locations are shown on Figure 5, a site plan superimposed on an aerial photo base.

Per agreement with DEQ, and based on previous investigations, the goal of the groundwater monitoring program has been the characterization of groundwater perched in the dredge fill sand. The dredge fill was placed on the original ground surface prior to site development. A geologic profile extending from the west side of the site to the Willamette River is shown on Figure 6. That profile shows that the groundwater in the dredge fill sand is perched on the pre-fill ground surface that is composed of silty soil.

Monthly groundwater depth measurements have been conducted in the monitoring wells during the RI. Those measurements have included river elevation readings conducted at the river staff gauge. The hydrology data are summarized on Table 3. Review of the data shows that the perched groundwater elevation fluctuations are highly sensitive to seasonal recharge from infiltration of precipitation upgradient of the site. Because the groundwater is perched on the original ground surface, some of the wells dry up seasonally, preventing sampling. This problem was anticipated by DEQ and Anchor, and was discussed during the process of designing the well monitoring system.

Figure 2 includes a potentiometric surface map of the perched groundwater based on groundwater depth measurements made on July 7, 2003. The contour pattern shows that the perched watertable surface mimics the site surface topography, which is normal for shallow perched groundwater. The contours indicate that perched groundwater moves from topographic high areas to low areas and ultimately discharges to the Willamette River. Anchor field staff conducts a monthly visual reconnaissance of the river bank to look for evidence of petroleum hydrocarbon seepage or other discharge from the bank. No petroleum hydrocarbon seeps or sheens have been observed to date. Groundwater seeps have been observed at the sand-silt interface during low river levels, at an estimated elevation of 8 feet msl.

Anchor has attempted to complete quarterly groundwater sampling during this RI. Four quarterly sampling events have been conducted. Because the wells were installed in phases, most of the wells have been sampled less than three times. Not all of the wells were sampled at each event, because of the low watertable conditions previously

described. Due to some groundwater turbidity issues encountered with the first two wells installed, low flow purging and sampling techniques are used at all site wells.

The historic groundwater quality data are compiled in the following tables.

- Table 4, TPH
- Table 5, VOCs
- Table 6, PAHs
- Table 7, Lead

The tabulated data include the preliminary results of the October 2003 sampling event. The October data are considered preliminary because the written report has not been received from the testing laboratory. Petroleum hydrocarbons (TPHs), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and lead have been detected in groundwater at the site. Quarterly monitoring will be continued until at least three samples adequately representing possible seasonal fluctuations have been obtained from all seven monitoring wells. The plans for future groundwater monitoring are in Section 4 of this Plan.

3.3 Storm Water

A City of Portland 48-inch storm water/sewer outfall, which collects runoff from NW St. Helens Road and facilities to the southwest, discharges to the Willamette River in front of the Brix facility, see Figure 5. This outfall is the largest storm water input to the Willamette River in the immediate site vicinity.

The Brix facility collects and discharges storm water via two outfalls as shown on Figure 5. The employee vehicle north parking lot is served by three storm drain catchments, connected in series to a four inch diameter pipe outfall to the Willamette. The equipment storage area is served by two storm drain catchments connected in series to a four inch diameter outfall located near the south property line.

Brix operational policy is designed to preclude storage and handling of petroleum fuels and lubricants within the drainage area of the catchments. Facility maintenance and

Table 3
Hydrology Data
Brix Maritime
Portland, Oregon

Anchor Environmental, L.L.C. — Site: Brix Maritime — Project No.: 990066-01

Well	Reference Elevation (Feet NAVD88)	Screen Interval (Feet NAVD88)	Date (MM/DD/YY)	Time (2400)	DTW (feet)	Water Elevation (Feet NAVD88)	Comments
Monitoring Wells							
MW-1	41.81	34.7-19.7	07/28/03	12:20	18.89	22.92	
MW-1	41.81	34.7-19.7	08/31/03	16:35	19.43	22.38	
MW-1	41.81	34.7-19.7	09/29/03	10:25	19.69	22.12	
MW-1	41.81	34.7-19.7	05/22/03	15:00	20.22	21.59	
MW-1	41.81	34.7-19.7	07/07/03	10:45	21.08	20.73	
MW-1	41.81	34.7-19.7	07/30/03	17:10	21.13	20.68	
MW-1	41.81	34.7-19.7	08/28/03	16:00	21.24	20.57	
MW-1	41.81	34.7-19.7	09/30/03	16:45	21.15	20.66	
MW-1	41.81	34.7-19.7	10/16/03	8:06	21.10	20.71	
MW-2	42.13	32.5-17.5	07/28/03	12:10	19.88	22.25	
MW-2	42.13	32.5-17.5	08/31/03	19:50	20.36	21.77	
MW-2	42.13	32.5-17.5	09/29/03	9:50	20.64	21.48	
MW-2	42.13	32.5-17.5	05/22/03	16:35	21.06	21.07	
MW-2	42.13	32.5-17.5	07/07/03	10:40	22.17	19.96	
MW-2	42.13	32.5-17.5	07/30/03	16:22	22.50	19.63	
MW-2	42.13	32.5-17.5	08/28/03	15:20	22.84	19.29	
MW-2	42.13	32.5-17.5	09/30/03	16:16	23.07	19.06	
MW-2	42.13	32.5-17.5	10/16/03	7:47	23.06	19.07	
MW-3	41.93	32.6-17.6	07/28/02	13:00	22.91	19.02	
MW-3	41.93	32.6-17.6	08/22/02	7:15	23.50	18.43	Oil detected in well, thickness estimated at 0.02 foot
MW-3	41.93	32.6-17.6	09/30/02	7:00	25.37	18.56	Oil detected in well, thickness estimated at 0.02 foot
MW-3	41.93	32.6-17.6	10/30/02	15:50	23.68	18.25	DTP = 23.49 (0.19 foot thick)
MW-3	41.93	32.6-17.6	11/27/02	16:30	23.50	18.43	DTP = 23.16 (0.34 foot thick)
MW-3	41.93	32.6-17.6	12/30/02	16:20	21.99	19.94	Oil noted on probe, product too thin to measure with interface probe
MW-3	41.93	32.6-17.6	02/28/03	12:15	19.75	22.18	Oil noted on probe, product too thin to measure with interface probe
MW-3	41.93	32.6-17.6	03/31/03	16:10	20.24	21.69	No oil noted on probe
MW-3	41.93	32.6-17.6	04/29/03	10:02	20.50	21.43	No oil noted on probe
MW-3	41.93	32.6-17.6	05/22/03	14:45	20.94	20.99	No oil noted on probe
MW-3	41.93	32.6-17.6	07/07/03	10:52	22.21	19.72	No oil noted on probe
MW-3	41.93	32.6-17.6	07/30/03	16:15	22.62	19.31	No oil noted on probe
MW-3	41.93	32.6-17.6	08/28/03	15:50	22.95	18.98	Oil noted on probe, product too thin to measure with interface probe
MW-3	41.93	32.6-17.6	09/30/03	17:00	23.15	18.78	DTP = 23.04 (0.11 foot thick)
MW-3	41.93	32.6-17.6	10/16/03	8:15	22.40	19.53	No oil noted on probe
MW-4	23.56	19.1-9.1	07/29/02	12:55	11.68	11.93	
MW-4	23.56	19.1-9.1	08/22/02	7:25	11.27	11.78	
MW-4	23.56	19.1-9.1	09/30/02	6:50	11.94	11.61	
MW-4	23.56	19.1-9.1	10/30/02	15:55	12.06	11.49	
MW-4	23.56	19.1-9.1	11/27/02	16:35	11.85	11.70	
MW-4	23.56	19.1-9.1	12/30/02	16:45	10.24	13.31	
MW-4	23.56	19.1-9.1	02/28/03	12:35	4.34	19.21	
MW-4	23.56	19.1-9.1	03/31/03	16:45	4.69	18.86	
MW-4	23.56	19.1-9.1	04/29/03	9:50	5.46	18.09	
MW-4	23.56	19.1-9.1	05/22/03	14:50	8.59	14.96	
MW-4	23.56	19.1-9.1	07/07/03	10:33	10.69	12.86	
MW-4	23.56	19.1-9.1	07/30/03	16:30	11.03	12.52	
MW-4	23.56	19.1-9.1	08/28/03	15:30	11.40	12.15	
MW-4	23.56	19.1-9.1	09/30/03	16:15	11.74	11.81	
MW-4	23.56	19.1-9.1	10/16/03	7:52	11.40	12.15	
MW-5	41.66	34.6-19.6	07/28/03	12:28	19.45	22.21	
MW-5	41.66	34.6-19.6	08/31/03	16:10	19.99	21.67	
MW-5	41.66	34.6-19.6	09/29/03	10:10	20.25	21.41	
MW-5	41.66	34.6-19.6	05/22/03	14:55	20.75	20.91	
MW-5	41.66	34.6-19.6	07/07/03	11:00	21.93	19.73	
MW-5	41.66	34.6-19.6	07/30/03	16:55	22.08	19.58	
MW-5	41.66	34.6-19.6	08/28/03	15:45	22.08	19.58	
MW-5	41.66	34.6-19.6	09/30/03	16:40	22.13	19.53	
MW-5	41.66	34.6-19.6	10/16/03	8:03	22.10	19.56	
MW-6	41.21	31.1-16.1	07/07/03	11:10	20.26	20.95	
MW-6	41.21	31.1-16.1	07/30/03	16:38	20.57	20.64	
MW-6	41.21	31.1-16.1	08/28/03	15:40	21.02	20.19	
MW-6	41.21	31.1-16.1	09/30/03	13:40	21.02	20.19	
MW-6	41.21	31.1-16.1	10/16/03	8:00	20.93	20.28	
MW-7	40.95	31.2-16.2	07/07/03	10:30	21.21	19.74	
MW-7	40.95	31.2-16.2	07/30/03	16:45	21.76	19.19	
MW-7	40.95	31.2-16.2	08/28/03	15:35	22.32	18.63	
MW-7	40.95	31.2-16.2	09/30/03	16:30	22.67	18.28	
MW-7	40.95	31.2-16.2	10/16/03	7:55	22.72	18.23	
River Gauge[1]							
River	4.33	NA	10/30/02	16:00	2.75	7.08	
River	4.33	NA	11/27/02	16:40	3.10	7.43	
River	4.33	NA	12/30/02	16:20	7.50	11.83	
River	4.33	NA	02/28/03	12:00	6.10	10.43	
River	4.33	NA	03/31/03	16:00	8.00	12.33	
River	4.33	NA	04/29/03	9:40	8.00	12.33	
River	4.33	NA	05/22/03	14:40	6.50	10.83	
River	4.33	NA	07/07/03	10:47	4.00	8.33	
River	4.33	NA	07/30/03	17:15	3.50	7.83	
River	4.33	NA	08/28/03	15:15	3.30	7.63	
River	4.33	NA	09/30/03	16:22	2.10	6.43	
River	4.33	NA	10/16/03	7:42	2.20	6.53	

Note: DTW = Depth to Water; DTP = Depth to Product; NA = Not Applicable.

1 - The river gauge is marked in 1-foot increments; field measurements are estimated to the closest 0.1 foot.

Table 4
Total Petroleum Hydrocarbons
Brix Maritime
Portland, Oregon

Location (sample depth in ft bgs)	Matrix	Date Sampled	Diesel Range Organics		Residual Range Organics		Gasoline Range Organics	
MW-1	Water	07/07/03	0.27	L	0.5	U	1.3	H
MW-1	Water	10/16/03	0.73	L	0.5	U	8.1	H
MW-2	Water	07/07/03	0.25	U	0.5	U	0.05	U
MW-2	Water	10/16/03	0.27	U	0.53	U	0.05	U
MW-3	Water	07/30/02	3.4	Y	1.6	O		
MW-3	Water	07/07/03	1.9	Y	8.5	O	0.05	U
MW-3	Water	10/16/03	0.92	Y	1.8	O	0.059	Y
MW-4	Water	07/29/02	0.26	U	0.52	U		
MW-4	Water	07/07/03	0.25	U	0.52	O	0.05	U
MW-4 Duplicate	Water	07/07/03	0.25	U	0.52	U	0.05	U
MW-4	Water	10/16/03	0.25	U	0.5	O	0.65	Y
MW-4 Duplicate	Water	10/16/03	0.25	U	0.5	U	0.66	Y
MW-6	Water	07/07/03	0.25	U	0.5	U	0.05	U
MW-6	Water	10/16/03	0.27	U	0.53	U	0.05	U
MW-7	Water	07/07/03	0.25	U	0.5	U	0.05	U
MW-7	Water	10/16/03	0.27	U	0.53	U	0.05	U
MW-1 (15-16.5)	Soil	02/11/03	360	L	110	U		
MW-2 (10-11.5)	Soil	02/11/03	40	H	130	U		
MW-4 (10-11.5)	Soil	07/17/02	35	U	140	U		
MW-5 (5-6.5)	Soil	02/11/03	28	U	110	U		
MW-5 (15-16.5)	Soil	02/11/03	27	U	110	U		
MW-5 (22.5-24)	Soil	02/11/03	96	H	390	O		
MW-6 (24.5-26)	Soil	06/19/03	34	U	140	U	6.6	U
MW-7 (25-26.5)	Soil	06/19/03	36	U	150	U	7.2	U

Notes: Water concentrations are in mg/L. Soil concentrations are in mg/kg.

ft bgs = feet below ground surface.

U = Not detected at method reporting limit.

O = The fingerprint resembles oil, but does not match the calibration standard.

L = The fingerprint resembles a petroleum product, but the elution pattern indicates the presence of lighter weight constituents than the calibration standard.

H = The fingerprint resembles a petroleum product, but the elution pattern indicates the presence of heavier weight constituents than the calibration standard.

Y = The fingerprint resembles a petroleum product in the correct carbon range, but the elution pattern does not match the calibration standard.

Table 5
Volatile Organic Compounds
Brix Maritime
Portland, Oregon

Sample Designation	Matrix	Date Sampled	Dichlorodifluoromethane	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	Acetone	1,1-Dichloroethene	Methyl tert-Butyl Ether	Carbon Disulfide	Methylene Chloride	trans- 1, 2-dichloroethene	1,1-Dichloroethane	2-Butanone	2,2-Dichloropropane	cis -1, 2-dichloroethene	Chloroform	Bromochloromethane	1,1,1-Trichloroethane	1,1-Dichloropropene	Carbon Tetrachloride
MW-1	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-1	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-1	Water	10/16/03	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	100 U	2.5 U	2.5 U	2.5 U	10 U	2.5 U	2.5 U	100 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
MW-2	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 UJ	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-2	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-2	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-3	Water	07/30/02	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-3	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 UJ	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-3	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-3	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4	Water	07/29/02	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 UJ	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4 Dup	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4 Dup	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-5	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 UJ	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-5 Dup	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 UJ	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-6	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-6	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-7	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-7	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-1 (15-16.5)	Soil	02/11/03	110 U	110 U	110 U	110 U	110 U	110 U	4200 U	110 U	110 U	11 U	420 U	110 U	110 U	4200 U	110 U	110 U	110 U	110 U	110 U	110 U	110 U
MW-2 (10-11.5)	Soil	02/11/03	0.87 U	1.3 U	0.77 U	0.99 U	0.97 U	0.91 U	13 U	0.86 U	0.79 U	1.9 U	1.2 U	0.91 U	0.97 U	11 U	1 U	1.1 U	0.72 U	0.65 U	0.71 U	0.91 U	0.74 U
MW-4 (10-11.5)	Soil	07/17/02	6.8 UJ	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	70	6.8 U	6.8 U	6.8 U	14 U	6.8 U	6.8 U	27 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U
MW-5 (5-6.5)	Soil	02/11/03	5.5 UJ	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	55 U	5.5 U	5.5 U	5.5 U	11 U	5.5 U	5.5 U	22 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
MW-5 (15-16.5)	Soil	02/11/03	5.4 UJ	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	54 U	5.4 U	5.4 U	5.4 U	11 U	5.4 U	5.4 U	22 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U
MW-5 (22.5-24)	Soil	02/11/03	7.5 UJ	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	85	7.5 U	7.5 U	7.5 U	15 U	7.5 U	7.5 U	30 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U
MW-6 (24.5-26)	Soil	06/19/03	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	67 U	6.7 U	6.7 U	6.7 U	14 U	6.7 U	6.7 U	27 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U
MW-7 (25-26.5)	Soil	06/19/03	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U	67 U	7.2 U	7.2 U	7.2 U	15 U	7.2 U	7.2 U	29 U	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U

NOTE: Water concentrations are in µg/L. Soil concentrations are in µg/kg. U = not detected at or above the indicated method reporting limit. J = estimated concentration.

DEQ 051671

Table 5
Volatile Organic Compounds
Brix Maritime
Portland, Oregon

Sample Designation	Matrix	Date Sampled	1,2-Dichloroethane	Benzene	Trichloroethene	1,2-Dichloropropene	Bromodichloromethane	Dibromomethane	2-Hexanone	cis-1,3-Dichloropropene	Toluene	trans 1,3-Dichloropropene	1,1,2-Trichloroethane	4-Methyl-2-pentanone	1,3 Dichloropropane	Tetrachloroethene	Dibromochloromethane	1,2 Dibromoethane	Chlorobenzene	1,1,1,2-Tetrachloroethane	Ethylbenzene	m,p-Xylene	o-Xylene	Styrene	Bromoform
MW-1	Water	02/28/03	0.5 U	5.7	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.71	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	37	50	12	0.5 U	0.5 U
MW-1	Water	07/07/03	0.5 U	1.3	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	1.1	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	11	18	2	0.5 U	0.5 U
MW-1	Water	10/16/03	2.5 U	32 D	2.5 U	2.5 U	2.5 U	2.5 U	100 U	2.5 U	13 D	2.5 U	2.5 U	100 U	2.5 U	2.5 U	2.5 U	10 U	2.5 U	2.5 U	270 D	360 D	110 D	2.5 U	2.5 U
MW-2	Water	02/28/03	0.5 U	0.50 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-2	Water	07/07/03	0.5 U	0.50 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-2	Water	10/16/03	0.5 U	0.50 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.86	0.5 U	0.5 U	0.5 U	0.5 U
MW-3	Water	07/30/02	0.5 U	0.73	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	14	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.51	3.5	2	0.5 U	0.5 U
MW-3	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.63	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	1.2	1.2	0.5 U	0.5 U
MW-3	Water	07/07/03	0.5 U	0.50 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.8	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	1.2	1.1	0.5 U	0.5 U
MW-3	Water	10/16/03	0.5 U	0.50 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	1.9	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.51	2.5	1.5	0.5 U	0.5 U
MW-4	Water	07/29/02	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4	Water	02/28/03	0.5 U	0.76	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	2.3	3.4	1.2	0.5 U	0.5 U
MW-4	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4 Dup	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-4	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.93	0.5 U	0.5 U	0.5 U	0.5 U
MW-4 Dup	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.94	0.5 U	0.5 U	0.5 U	0.5 U
MW-5	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	15	12	0.97	0.5 U	0.5 U
MW-5 Dup	Water	02/28/03	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	16	14	1.10	0.5 U	0.5 U
MW-6	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-6	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.74	0.5 U	0.5 U	0.5 U	0.5 U
MW-7	Water	07/07/03	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MW-7	Water	10/16/03	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	0.82	0.5 U	0.5 U	0.5 U	0.5 U
MW 1 (15-16.5)	Soil	02/11/03	110 U	110 U	110 U	110 UJ	110 U	110 U	4200 U	110 UJ	110 U	110 U	110 U	4200 U	110 U	110 U	110 UJ	420 U	110 U	110 U	1000	1600	440	110 U	110 U
MW-2 (10-11.5)	Soil	02/11/03	0.83 U	0.98 U	0.35 U	0.89 UJ	0.66 U	0.89 U	7.6 U	0.94 UJ	1.1 U	0.74 U	0.86 U	6.8 U	0.65 U	0.39 U	0.74 UJ	0.98 U	0.87 U	0.63 U	0.71 U	1.9 U	0.86 U	0.91 U	0.81 U
MW-4 (10-11.5)	Soil	07/17/02	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	27 U	6.8 U	6.8 U	6.8 U	6.8 U	27 U	6.8 U	6.8 U	6.8 U	27 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U
MW-5 (5-6.5)	Soil	02/11/03	5.5 U	5.5 U	5.5 U	5.5 UJ	5.5 U	5.5 U	22 U	5.5 UJ	5.5 U	5.5 U	5.5 U	22 U	5.5 U	5.5 U	5.5 UJ	22 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
MW-5 (15-16.5)	Soil	02/11/03	5.4 U	5.4 U	5.4 U	5.4 UJ	5.4 U	5.4 U	22 U	5.4 UJ	5.4 U	5.4 U	5.4 U	22 U	5.4 U	5.4 U	5.4 UJ	22 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U
MW-5 (22.5-24)	Soil	02/11/03	7.5 U	7.5 U	7.5 U	7.5 UJ	7.5 U	7.5 U	30 U	7.5 UJ	7.5 U	7.5 U	7.5 U	30 U	7.5 U	7.5 U	7.5 UJ	30 U	7.5 U	7.5 U	2500	2700	33	7.5 U	7.5 U
MW-6 (24.5-26)	Soil	06/19/03	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	27 U	6.7 U	6.7 U	6.7 U	6.7 U	27 U	6.7 U	6.7 U	6.7 U	27 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U
MW-7 (25-26.5)	Soil	06/19/03	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U	29 U	7.2 U	7.2 U	7.2 U	7.2 U	29 U	7.2 U	7.2 U	7.2 U	29 U	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U	7.2 U

NOTE: Water concentrations are in µg/L. Soil concentrations are in µg/kg. U = not detected at or above the indicated method reporting limit. J = estimated concentration.

Table 5
Volatile Organic Compounds
Brix Maritime
Portland, Oregon

Sample Designation	Matrix	Date Sampled	Isopropylbenzene	1,1,2,2-Tetrachloroethane	1,2,3-Trichloropropane	Bromobenzene	n-Propylbenzene	2-Chlorotoluene	4-Chlorotoluene	1,3,5-Trimethylbenzene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	1,3-Dichlorobenzene	4-Isopropyltoluene	1,4-Dichlorobenzene	n-Butylbenzene	1,2-Dichlorobenzene	1,2-Dibromo-3-chloropropane	1,2,4-Trichlorobenzene	1,2,3-Trichlorobenzene	Naphthalene	Hexachlorobutadiene
MW-1	Water	02/28/03	19	0.5 U	0.5 U	0.5 U	65 D	2 U	2 U	26	2 U	140 D	10	0.5 U	2 U	0.5 U	21	0.5 U	0.5 U	2 U	2 U	31	2 U
MW-1	Water	07/07/03	31	0.5 U	0.5 U	0.5 U	64 D	2 U	2 U	9.3	2 U	46	8.2	0.5 U	2 U	0.5 U	14	0.5 U	0.5 U	2 U	2 U	22	2 U
MW-1	Water	10/16/03	75 D	2.5 U	2.5 U	10 U	250 D	10 U	10 U	280 D	10 U	1200 D	28 D	2.5 U	10 U	2.5 U	150 U	2.5 U	10 U	10 U	10 U	460 D	10 U
MW-2	Water	02/28/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-2	Water	07/07/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-2	Water	10/16/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-3	Water	07/30/02	0.5 U	0.5 U	0.5 U	0.5 U	2.3	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-3	Water	02/28/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-3	Water	07/07/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-3	Water	10/16/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-4	Water	07/29/02	2 U	0.5 U	0.5 U	0.5 U	2.3	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-4	Water	02/28/03	29	0.5 U	0.5 U	0.5 U	35	2 U	2 U	2.2	2 U	3.8	2 U	0.5 U	2 U	0.5 U	3.1	0.5 U	0.5 U	2 U	2 U	45	2 U
MW-4	Water	07/07/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-4 Dup	Water	07/07/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-4	Water	10/16/03	7.1	0.5 U	0.5 U	0.5 U	5.5	2 U	2 U	2 U	2 U	2 U	4.4	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-4 Dup	Water	10/16/03	7.5	0.5 U	0.5 U	0.5 U	6.3	2 U	2 U	2 U	2 U	2 U	4.8	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-5	Water	02/28/03	24	0.5 U	0.5 U	0.5 U	110 D	2 U	2 U	26	2 U	75 D	27	0.5 U	2 U	0.5 U	87 D	0.5 U	0.5 U	2 U	2 U	83	2 U
MW-5 Dup	Water	02/28/03	25	0.5 U	0.5 U	0.5 U	110 D	2 U	2 U	30	2 U	99 D	30	0.5 U	2.3	0.5 U	110 D	0.5 U	0.5 U	2 U	2 U	25	2 U
MW-6	Water	07/07/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-6	Water	10/16/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-7	Water	07/07/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-7	Water	10/16/03	2 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.5 U	2 U	0.5 U	2 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
MW-1 (15-16.5)	Soil	02/11/03	3000	110 U	110 U	420 U	18000	420 U	420 U	7800 U	420 U	59000	7300 U	110 U	1800	110 U	29000	110 U	420 U	420 U	420 U	64000	420 U
MW-2 (10-11.5)	Soil	02/11/03	0.84 U	0.91 U	0.76 U	1 U	0.89 U	0.91 U	0.92 U	4.7 U	0.92 U	1.1 U	0.92 U	0.88 U	0.89 U	1.1 U	0.93 U	0.81 U	1.1 U	0.95 U	1.2 U	1.1 U	0.93 U
MW-4 (10-11.5)	Soil	07/17/02	6.8 U	6.8 U	6.8 U	6.8 U	27 U	27 U	27 U	27 U	27 U	27 U	27 U	6.8 U	27 U	6.8 U	27 U	6.8 U	6.8 U	27 U	27 U	27 U	27 U
MW-5 (5-6.5)	Soil	02/11/03	5.5 U	5.5 U	5.5 U	5.5 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	5.5 U	22 U	5.5 U	22 U	5.5 U	5.5 U	22 U	22 U	22 U	22 U
MW-5 (15-16.5)	Soil	02/11/03	5.4 U	5.4 U	5.4 U	5.4 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	5.4 U	22 U	5.4 U	22 U	5.4 U	5.4 U	22 U	22 U	22 U	22 U
MW-5 (22.5-24)	Soil	02/11/03	7900	7.5 U	7.5 U	7.5 U	30 U	65 U	30 U	970 U	30 U	20000	180	7.5 U	33	7.5 U	2500 U	7.5 U	7.5 U	30 U	30 U	4500	30 U
MW-6 (24.5-26)	Soil	06/19/03	27 U	6.7 U	6.7 U	6.7 U	27 U	65 U	27 U	27 U	27 U	27 U	27 U	6.7 U	27 U	6.7 U	27 U	6.7 U	6.7 U	27 U	27 U	27 U	27 U
MW-7 (25-26.5)	Soil	06/19/03	29 U	7.2 U	7.2 U	7.2 U	29 U	65 U	29 U	29 U	29 U	29 U	29 U	7.2 U	29 U	7.2 U	29 U	7.2 U	7.2 U	29 U	29 U	29 U	29 U

NOTE: Water concentrations are in ug/L. Soil concentrations are in µg/kg. U = not detected at or above the indicated method reporting limit. J = estimated concentration.

TABLE 6
Polycyclic Aromatic Hydrocarbons
Brix Maritime
Portland, Oregon

Sample Designation	MW 1	MW 1	MW-1	MW 2	MW-2	MW-2	MW-3	MW-3	MW-3	MW-3
Matrix	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Date Sampled	02/28/03	07/07/03	10/16/03	02/28/03	07/07/03	10/16/03	07/30/02	02/28/03	07/07/03	10/16/03
LPAHs										
Naphthalene	23 U	23 D	140 D	0.012	0.02 U	0.023	0.36	0.73	0.54	0.51
Acenaphthylene	0.19	0.02 U	0.02 U	0.005	0.02 U	0.022 U	0.02 U	0.22	0.02 U	0.02 U
Acenaphthene	0.45	0.38	0.34	0.02 U	0.02 U	0.022 U	0.24	3.3	0.36	0.22
Dibenzofuran	0.12	0.087	0.083	0.02 U	0.02 U	0.022 U	0.015	0.51	0.02 U	0.021
Fluorene	0.56	0.27	0.24	0.02 U	0.02 U	0.022 U	0.29	1.0	0.1	0.11
Phenanthrene	1.6	0.56	0.42	0.15	0.02 U	0.031	0.11	2.9	0.2	0.34
Anthracene	0.53	0.11	0.065	0.003	0.02 U	0.022 U	0.02 U	0.53	0.009	0.022
2-Methylnaphthalene	9.0	7.9	42.0 D	0.02 U	0.02 U	0.022 U	0.25	1.8	0.54	0.51
Total LPAH	35.43	31.29	203.13	0.29		0.05	1.33	8.63	1.18	1.13
HPAHs										
Fluoranthene	4.3	0.5	0.3	0.29	0.02 U	0.070	0.056	4.5	0.22	0.077
Pyrene	15 D	1.2	0.9	0.42	0.02 U	0.091	0.084	7.6 D	0.22	0.092
Benz(a)anthracene	2.1	0.22	0.16	0.11	0.02 U	0.023	0.02 U	2.1 D	0.06	0.02 U
Chrysene	2.7	0.27	0.24	0.27	0.02 U	0.042	0.02 U	1.3 D	0.071	0.02 U
Benzo(b)fluoranthene	1.4	0.066	0.073	0.14	0.02 U	0.036	0.022	1.6 D	0.058	0.02 U
Benzo(k)fluoranthene	1.1	0.058	0.096	0.13	0.02 U	0.035	0.02 U	1.7 D	0.063	0.02 U
Benzo(a)pyrene	2.0	0.11	0.097	0.19	0.02 U	0.022 U	0.02 U	2.3 D	0.053	0.02 U
Indeno(1,2,3-cd)pyrene	1.3	0.023	0.034	0.20	0.02 U	0.073	0.02 U	1.5 D	0.041	0.02 U
Dibenz(a,h)anthracene	0.17	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U	0.02 U	0.20 U	0.20 U	0.02 U
Benzo(g,h,i)perylene	1.5	0.025	0.043	0.22	0.02 U	0.090	0.02 U	1.9 D	0.039	0.02 U
Total HPAHs	29.77	2.53	3.98	1.87		0.46	0.18	26.59	0.89	0.16

Sample Designation	MW-4	MW-4	MW-4	MW-4 Dup	MW-4	MW-4 Dup	MW-6	MW-6 dup	MW-6	MW-6	MW-7	MW 7
Matrix	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Date Sampled	07/29/02	02/28/03	07/07/03	07/07/03	10/16/03	10/16/03	02/28/03	02/28/03	07/07/03	10/16/03	07/07/03	10/16/03
LPAHs												
Naphthalene	0.039	23 D	0.16	0.12	0.11	0.12	19 D	17 D	0.02 U	0.02 U	0.02 U	0.02 U
Acenaphthylene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.10	0.40	0.02 U	0.02 U	0.02 U	0.02 U
Acenaphthene	0.51	0.60	0.11	0.11	0.34	0.40	1.3	1.5	0.02 U	0.02 U	0.02 U	0.02 U
Dibenzofuran	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.2	0.53	0.02 U	0.02 U	0.02 U	0.02 U
Fluorene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	1.2	1.3	0.02 U	0.02 U	0.02 U	0.02 U
Phenanthrene	0.048	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	2.3	3.1	0.02 U	0.02 U	0.02 U	0.02 U
Anthracene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.55	0.50	0.02 U	0.02 U	0.02 U	0.02 U
2-Methylnaphthalene	0.02 U	8.80	0.02 U	0.02 U	0.02 U	0.02 U	31 D	31 D	0.02 U	0.02 U	0.02 U	0.02 U
Total LPAH	0.59	39.40	0.27	0.23	0.47	0.52	53.64	53.22				
HPAHs												
Fluoranthene	0.033	0.024	0.02 U	0.02 U	0.02 U	0.02 U	5.5 J	6.5 J	0.02 U	0.02 U	0.02 U	0.02 U
Pyrene	0.046	0.055	0.021	0.02 U	0.02	0.071	4.5 J	9.1 J	0.02 U	0.02 U	0.02 U	0.02 U
Benz(a)anthracene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.22 J	2.00 J	0.02 U	0.02 U	0.02 U	0.02 U
Chrysene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.96 J	5.4 J	0.02 U	0.02 U	0.02 U	0.02 U
Benzo(b)fluoranthene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.44 J	2.2 J	0.02 U	0.02 U	0.02 U	0.02 U
Benzo(k)fluoranthene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.42 J	1.9 J	0.02 U	0.02 U	0.02 U	0.02 U
Benzo(a)pyrene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.65 J	3.6 J	0.02 U	0.02 U	0.02 U	0.02 U
Indeno(1,2,3-cd)pyrene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.43 J	2.5 J	0.02 U	0.02 U	0.02 U	0.02 U
Dibenz(a,h)anthracene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.044 J	0.27 J	0.02 U	0.02 U	0.02 U	0.02 U
Benzo(g,h,i)perylene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.52 J	2.7 J	0.02 U	0.02 U	0.02 U	0.02 U
Total HPAHs	0.08	0.08	0.021			0.074	21.64	34.97				

NOTE: µg/L = micrograms per liter or parts per billion.
µg/kg = micrograms per kilogram or parts per billion.
J = estimated concentration.
U = not detected at or above the indicated method reporting limit.

TABLE 6
Polycyclic Aromatic Hydrocarbons
Brix Maritime
Portland, Oregon

Sample Designation	MW-1 (13-14.5)		MW-2 (10-11.5)		MW-4 (10-11.5)		MW-5 (5-6.5)		MW-6 (15-16.5)		MW-8 (22.5-24)		MW-6 (24.5-26)		MW-7 (25.0-26.5)	
Matrix	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Date Sampled	02/11/03		02/11/03		07/17/01		02/11/03		02/11/03		02/11/03		06/19/03		06/19/03	
LPAHs	LPAHs															
Naphthalene	22000	D	25		43		5	U	4.8	U	1400	D	43		5	U
Acenaphthylene	4.8	U	12		21		5	U	4.8	U	35		39		5	U
Acenaphthene	52		21		7.1	U	21		4.8	U	35		50		5	U
Dibenzofuran	14		6	U	7.1	U	21		4.8	U	17		18		5	U
Fluorene	210		20		7.3		23		4.8	U	21		40		5	U
Phenanthrene	260		150		85		440		9.2		490		340		15	
Anthracene	59		48		21		34		4.8		82		86		7	
2-Methylnaphthalene	20000	D	11.0		5.4		5.9	U	4.8	U	910		29		5	U
Total LPAH	44870		297.0		191.7		410.0		14.7		3426		679		50	
HPAHs	HPAHs															
Fluoranthene	210		220		66		78		29		710		500		55	
Pyrene	160		410		63		77		43		850		550		75	
Benz(a)anthracene	34		130		18		9		16		310		280		40	
Chrysene	60		150		29		24		25		540		360		65	
Benzo(b)fluoranthene	72		44		23		72		16		830		190		37	
Benzo(k)fluoranthene	39		95		29		33		21		620		220		34	
Benzo(a)pyrene	36		150		31		14		23		920		440		64	
Indeno(1,2,3-cd)pyrene	38		120		20		21		23		2000	D	230		40	
Dibenz(a,h)anthracene	4.8	U	13		7.1	U	5.0	U	4.8	U	150		36		9	
Benzo(g,h,i)perylene	43		120		49		22		28		2300	D	360		34	
Total HPAHs	677		1592		355		260		191		9318		3336		526	

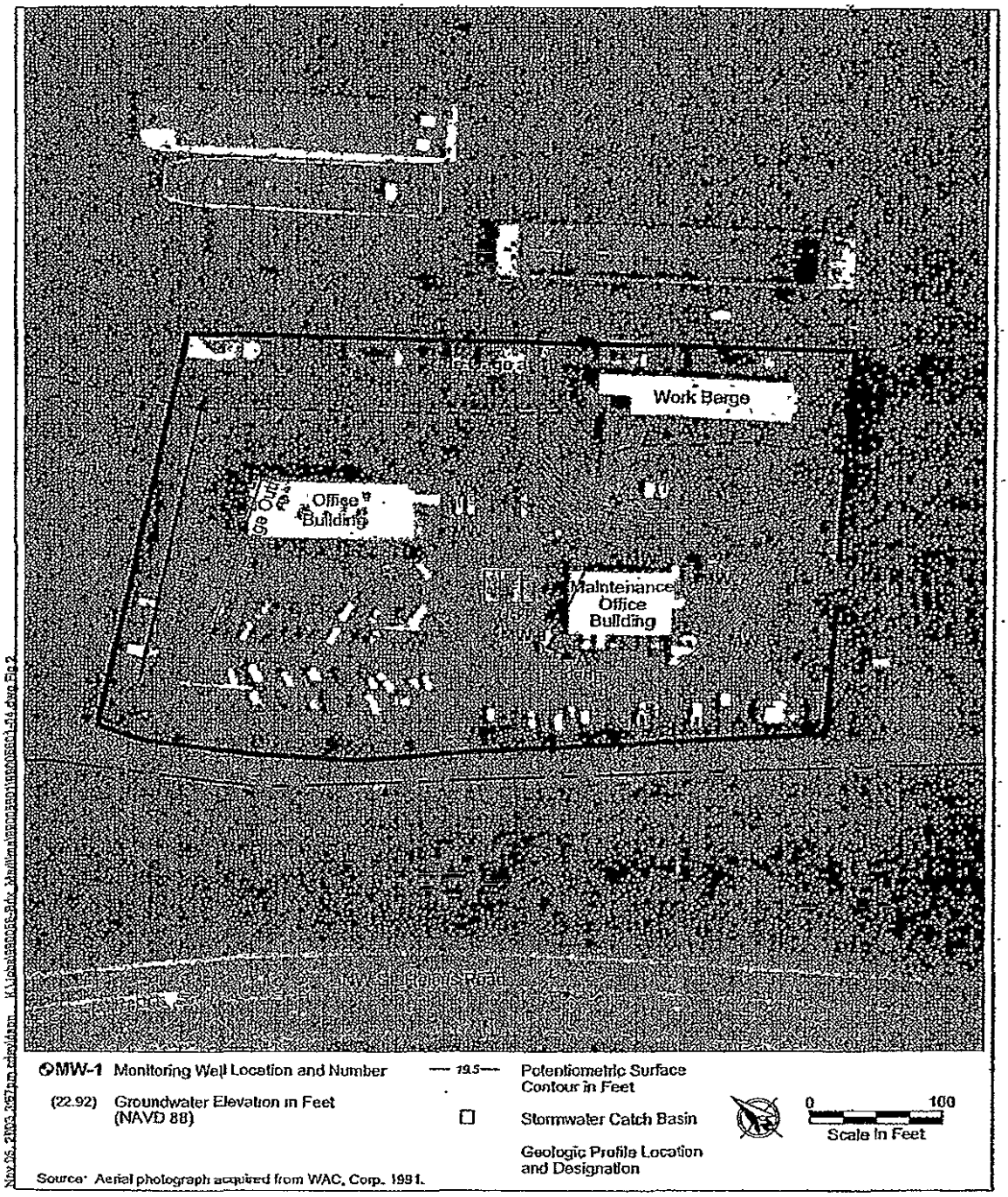
NOTE: µg/L = micrograms per liter or
ppb; µg/kg = micrograms per kilogram or
J = estimated concentration.
U = not detected at or above t

Table 7
Lead in Groundwater
Brix Maritime
Portland, Oregon

Location	Matrix	Date Sampled	Total Lead (ppb)		Dissolved Lead (ppb)	
MW-1	Water	02/28/03	288		0.03	
MW-1	Water	07/07/03	1.34		0.05	
MW-1	Water	10/16/03	1.41		0.06	
MW-2	Water	02/28/03	57.6		0.04	
MW-2	Water	07/07/03	0.04		0.05	
MW-2	Water	10/16/03	25.9		0.58	
MW-3	Water	07/30/02	0.88		0.13	
MW-3	Water	02/28/03	65.9		0.05	
MW-3	Water	07/07/03	0.36		0.08	
MW-3	Water	10/16/03	0.22		0.05	
MW-4	Water	07/29/02	0.36		0.02	U
MW-4	Water	02/28/03	0.70		0.02	U
MW-4	Water	07/07/03	0.78	J	0.02	
MW-4 Duplicate	Water	07/07/03	0.18	J	0.03	
MW-4	Water	10/16/03	0.46		0.03	
MW-4 Duplicate	Water	10/16/03	0.54		0.02	U
MW-5	Water	02/28/03	131		0.06	
MW-5 Duplicate	Water	02/28/03	116		0.03	
MW-6	Water	07/07/03	0.1		0.02	U
MW-6	Water	10/16/03	0.03		0.07	
MW-7	Water	07/07/03	0.17		0.02	U
MW-7	Water	10/16/03	0.02	U	0.03	

Note. U = not detected at method reporting limit. ppb = parts per billion. J = estimated
Water concentrations are in µg/L. Soil concentrations are in µg/kg.

DEQ 051675



ANCHOR ENVIRONMENTAL, L.L.C.

Figure 5
Well Location and Potentiometric Surface Map (July 7, 2003)
Brix Maritime

DEQ 051680